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BULLETIN No. 192

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# FEEDING PURE-BRED DRAFT FILLIES

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By J. L. EDMONDS

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## Summary of Bulletin No. 192

Object.—To determine the efficiency of alfalfa hay, corn, and oats in growing pure-bred draft fillies to two years of age.

Plan.—Ten pure-bred Percheron fillies were fed from weanlings to two years of age. The experiment, covering two winter and one summer feeding periods, began December 8, 1914, and ended when the fillies were turned on pasture May 8, 1916. Oats and corn were fed, one-half of each by weight, with alfalfa hay as the sole roughage. The pasture was a blue-grass sod, containing a slight mixture of other grasses. Page 427

Results.—The trial seemed to indicate that a liberal portion of well-cured legume hay should be the foundation for feeding young, growing horses. Along with this roughage, enough grain should be fed to produce the desired growth. In this experiment it seemed necessary, unless the fillies received a set-back in growth, to feed some grain thruout the pasture season. Pages 429, 434

Alfalfa hay fed with corn and oats gave results of a character which indicates that there is little or no need of feeding purchased mill feeds to growing horses when alfalfa can be grown on the farm. When alfalfa hay is the roughage used, a considerable proportion of the grain ration may safely be corn. In this experiment the proportion was one-half by weight. Page 436

The average total feed consumed per head during the experiment was 45.35 bushels of corn, 79.36 bushels of oats, 2.58 tons of alfalfa hay, and four-fifths of an acre of good grass. The average total gain in weight per individual was 690.5 pounds, and in height, 7.96 inches. The average daily gain was 1⅓ pounds. Pages 434, 437

During the first winter an average of 5.674 pounds of grain and 4.266 pounds of hay was required per pound of gain. The second winter feeding period required an average of 9.228 pounds of grain and 12.99 pounds of hay per pound of gain. Pages 437-438

The average weight of the lot at twelve months was 1,112 pounds; at twenty-four months, 1,548 pounds. The average weight of eight head, the two youngest fillies being excluded, at corresponding ages, was 1,128 pounds and 1,578 pounds respectively. The growthiest filly weighed 1,260 pounds at twelve months and 1,775 pounds at twenty-four months. Pages 437, 439

Cost.—The three sets of prices used in figuring the feed cost show $86.88, $105.50, and $108.49, respectively, as the value of the feed consumed by the ten head. Pages 439-440

# FEEDING PURE-BRED DRAFT FILLIES

By J. L. EDMONDS, Assistant Chief in Horse Husbandry

## OBJECT OF THE EXPERIMENT

From weaning time to two years of age is generally recognized as a critical period in the development of draft horses. Both grades and pure-breds are frequently not well enough grown out to permit anywhere near the development of their inherent possibilities. The object of the experiment reported in this bulletin was to determine the efficiency of alfalfa hay, corn, and oats in growing pure-bred weanling draft fillies to two years of age.

## PLAN

Ten pure-bred Percheron filly foals dropped in the spring and summer of 1914 were used in the trial. Four of the number were foaled by mares owned by the Experiment Station; the rest were purchased from Illinois breeders. The experiment began December 8, 1914. The fillies were carried thru two winters and one summer, the trial being completed May 8, 1916.

### Feed

The grain feeds used were oats and corn, one-half of each by weight. Grain was fed three times a day except when the fillies were on grass; then it was fed twice a day. During the first winter the oats and corn were ground, and after that whole oats and shelled corn were fed. Shelled corn was used instead of ear corn because it insured each individual a somewhat better chance of obtaining her share. Alfalfa hay grown on the farm of the Animal Husbandry Department was the sole roughage used. Hay was fed twice a day except when the fillies were on pasture, during a part of which time no hay was fed; after the pasture became short, hay was fed once a day. More grain would have been eaten than was fed; with the alfalfa hay, however, the aim thruout the trial was to feed as much of it as would be thoroly cleaned up. This method of feeding resulted in no feed being wasted and did away with any necessity of weighing back refused feed. Alfalfa, corn, and oats were the feeds selected, since the aim was to secure good results with farm feeds rather than purchased mill feeds, and these three are widely available on corn-belt farms. The ten head were fed in one lot from racks and troughs built along the sides of the loose boxes used for shelter.

Samples of the grain and hay were saved regularly at each feeding time. The results of the analyses of these samples which were made by the division of animal nutrition of this station are given in Table A, page 441.

The pasture, eight acres in area, was heavy blue grass with a slight mixture of timothy, orchard grass, medium red, and white clover. The fillies ran on pasture during pasture season only; at other times they had access to a half-acre cinder lot.

Salt was regularly added to the grain feed.

Well water was supplied from a tank so located that one-half of it was available in each box stall.

### SHELTER

The fillies' shelter consisted of two 16-by-20-foot box stalls. Doors 8 feet wide opened into a small cinder lot which connected the boxes with the pasture and the half-acre cinder-covered exercise lot. The box-stall doors were closed only during a very few of the most stormy nights in winter. Altho at practically all other times the fillies had their choice of being outdoors or in, they seemed to prefer the open, except at feeding times and during the heat of the day in summer. This method of stabling insured sufficient protection without any undue restriction of opportunity for exercise, which must accompany good feeding if the best all-around results are to be obtained. Canvas "flappers" nailed to the over-head joists assisted in keeping the flies off the backs of the fillies. An application of coal-tar disinfectant to the lower part of the canvas prevented it from being chewed or torn down.

### BEDDING

Shavings were used for bedding. Straw bedding, while most desirable in ordinary practice, would have prevented an accurate feed record because a varying portion of it would have been eaten. Fresh bedding was added as needed; the box stalls were cleaned directly into the manure wagons once or twice a month.

### GROOMING

The fillies were tied up daily and given a hurried grooming with a dandy-brush. Once a month, or oftener if necessary, their feet were gone over carefully and leveled with a hoof rasp.

## DESCRIPTION OF THE FILLIES

Table 1 describes the pure-bred Percheron fillies used in this experiment. The group pictures, taken late in the winter, show quite clearly the sort of fillies which made up the lot. Two of the ten head,

Isabel and Dorethy, were at some disadvantage because they were younger than the rest of the lot. All individuals, as their weights would indicate, had received good treatment previous to the time of the experiment.

TABLE 1.—DESCRIPTION OF FILLIES AT BEGINNING OF EXPERIMENT, DECEMBER 8, 1914

| Name | Stud-book No. | Breeder | Color | Date foaled, 1914 | Age | Weight | Height | |
|---|---|---|---|---|---|---|---|---|
| | | | | | *days* | *lbs.* | *hands* | *inches* |
| Blue Bell.. | 110669 | University of Illinois... | Gray, star, stripe... | May 13. | 209 | 810 | 13 | 2¼ |
| Dorethy... | 110194 | Geo. Frerichs and Sons.... | Black, white on right hind foot..... | June 2. | 189 | 725 | 13 | 1½ |
| Dottie Sloan... | 106156 | Geo. Frerichs and Sons.... | Black, star | May 15. | 207 | 930 | 13 | 2 |
| Eleanor... | 110668 | University of Illinois... | Gray, star | Apr. 25 | 227 | 970 | 14 | ½ |
| Isabel..... | 110670 | University of Illinois... | Gray, elongated star..... | July 2. | 159 | 685 | 13 | 1¼ |
| Karol..... | 110836 | Imported in dam ..... | Gray..... | Apr. 12 | 240 | 880 | 13 | 3¾ |
| Madame... | 109992 | A. L. Robison and Sons.... | Black, tan markings.. | Apr. 23 | 229 | 830 | 13 | 3½ |
| Midinette.. | 109993 | A. L. Robison and Sons.... | Gray..... | Apr. 28 | 224 | 810 | 13 | ¾ |
| Primrose.. | 106240 | Geo. Frerichs and Sons.... | Black, star. | May 25. | 197 | 775 | 13 | 1¾ |
| Miss Yoke. | 111136 | G. W. Weyhrich | Gray..... | Mar. 21 | 262 | 815 | 13 | 2¼ |
| Average of 10 head..... | | | | | 214.3 | 823 | 13 | 2⅓ |

## DISCUSSION OF RESULTS

Table 2 shows the average individual consumption of feed for the different periods of the experiment, and Tables 3 and 4 the weights, heights, and gains of the fillies during the same periods.

During the first period, the fillies were allowed as much grain and hay as they would readily consume. This, tho it resulted in good gains, did not seem to be a profitable nor an entirely safe procedure because of the high grain consumption. Accordingly, the grain ration was gradually restricted until it was reduced to an amount which insured the consumption of a pound or more of hay per day to the hundredweight of filly. Experience here would seem to indicate that a liberal portion of well-cured legume hay should be the foundation for feeding young, growing horses. In addition to the legume rough-

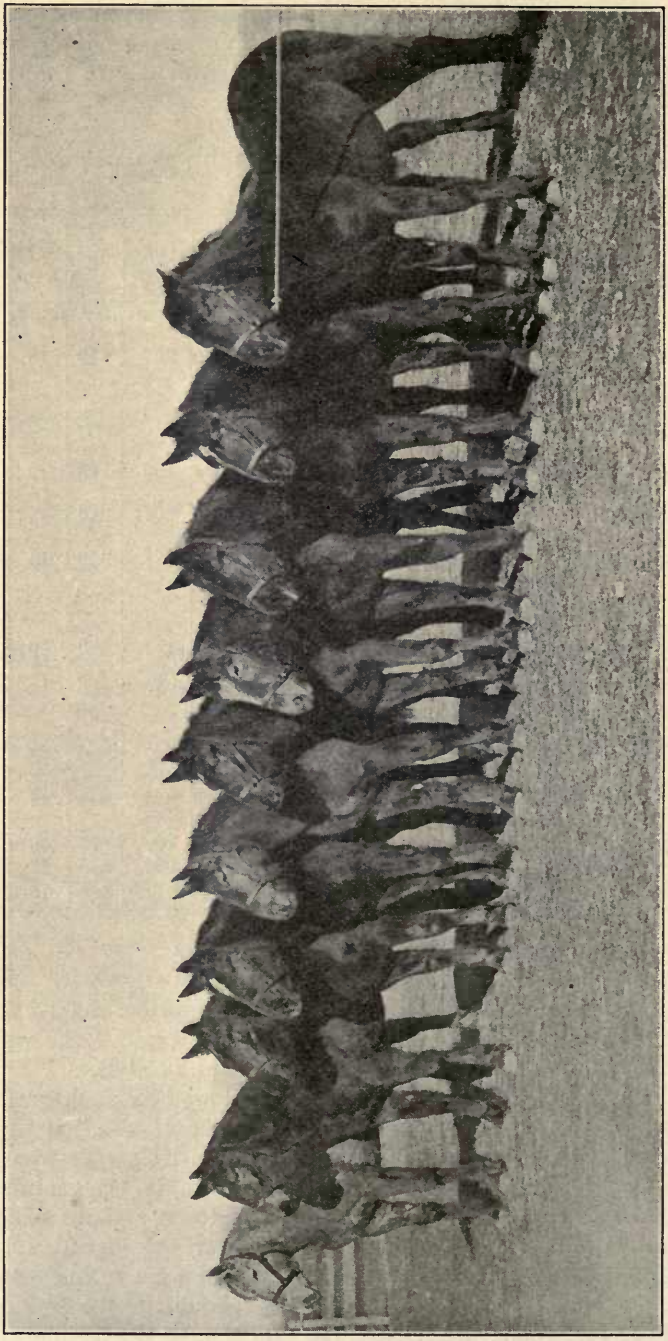

FIG. 1.—THE LOT AS YEARLINGS

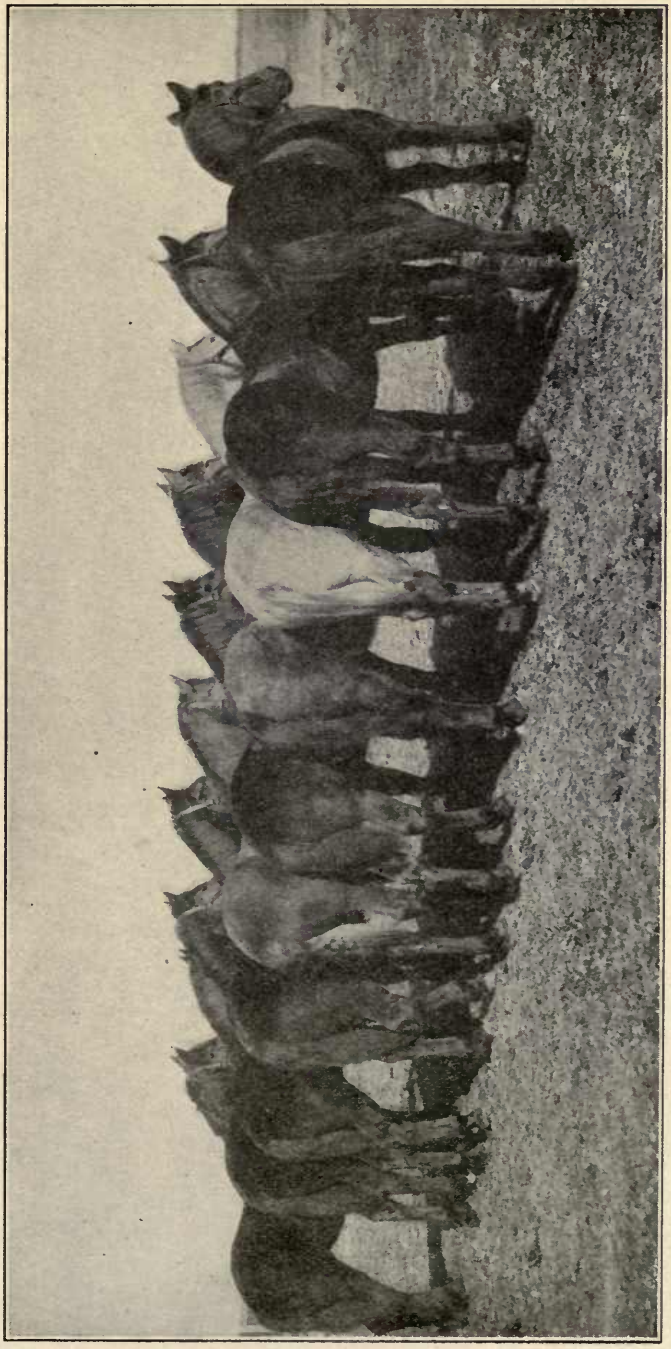

FIG. 2.—THE LOT AS YEARLINGS

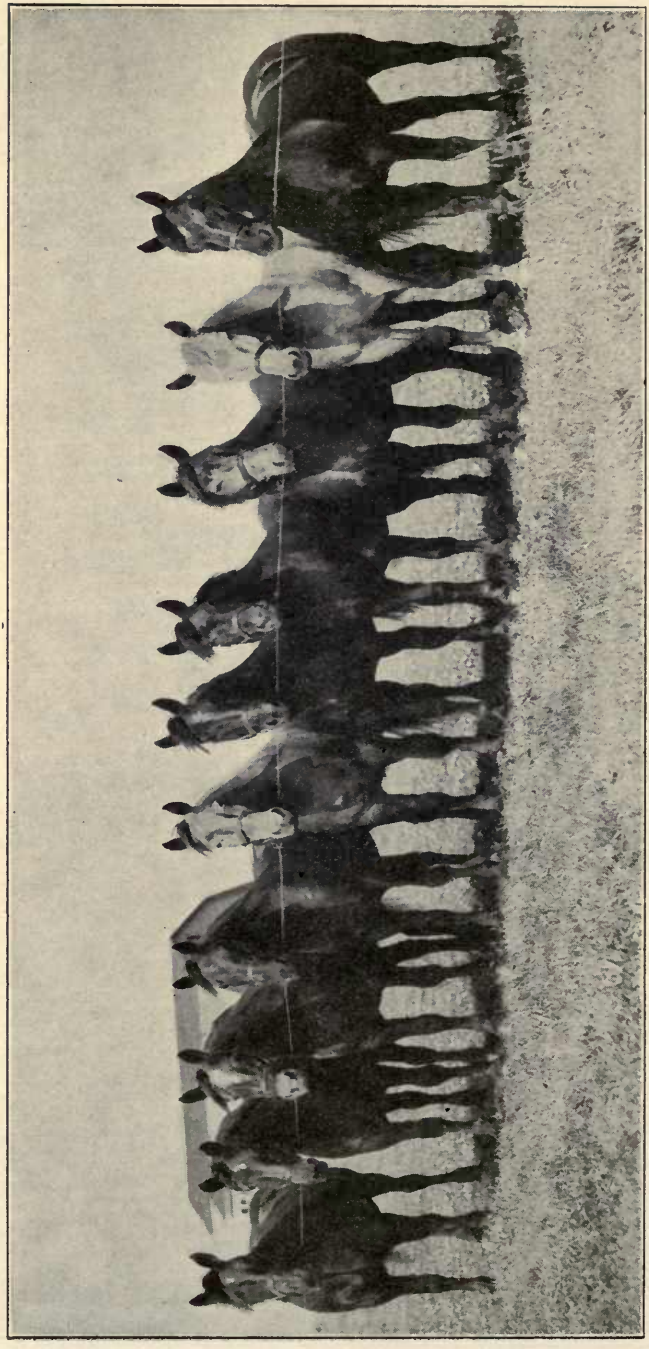

FIG. 3.—THE LOT AS TWO-YEAR-OLDS

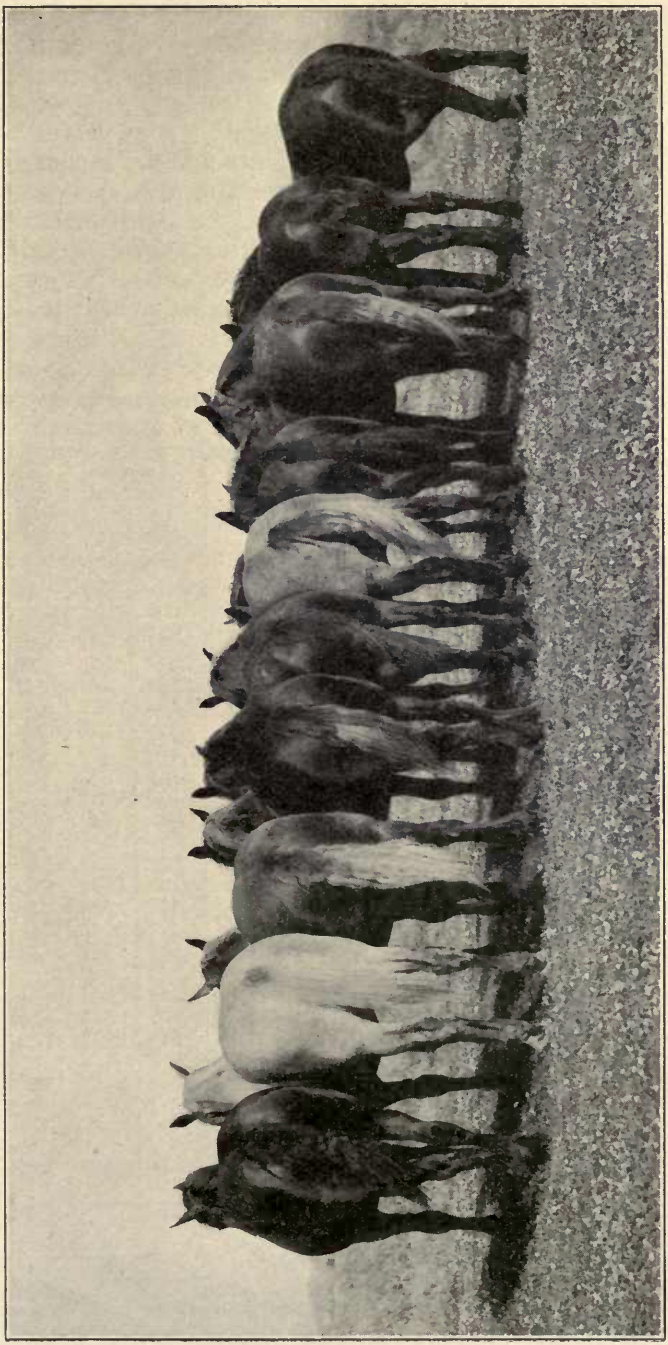

FIG. 4.—THE LOT AS TWO-YEAR-OLDS

age, enough grain should be fed to produce good growth. The figures indicate that as the individual becomes older it is possible and desirable to decrease the proportion of grain and increase the proportion of hay, and still obtain excellent gains.

A grain feed of approximately one-half pound per day to the hundredweight of filly seems to be enough to produce proper development on pasture. Altho the pasture used in this experiment was about as good as can ordinarily be found, the eight acres were not quite enough to furnish an abundance of grass. This made it necessary during three of the periods on pasture to feed an amount of hay daily which equaled the amount of grain fed at that time.

TABLE 2.—FEED CONSUMED BY PERIODS

(Grain[1] = Corn ½ and Oats ½: Hay = Alfalfa Hay[2] and Pasture[3])
(Expressed in pounds)

| Period: 28 days | Average daily ration per head | | Average total feed per head per period | | Average daily feed per day per cwt. of animal | | Average amount of feed required per pound of gain | |
|---|---|---|---|---|---|---|---|---|
| | Grain | Hay | Grain | Hay | Grain | Hay | Grain | Hay |
| Dec. 8, 1914–Jan. 4, 1915 | 13.72 | 4.97 | 384.2 | 139.2 | 1.607 | .582 | 6.57 | 2.38 |
| Jan. 5–Feb. 1.. | 10.96 | 4.93 | 307.0 | 138.0 | 1.224 | .550 | 7.22 | 3.25 |
| Feb. 2–Mch. 1.. | 10.79 | 8.94 | 302.0 | 250.2 | 1.124 | .931 | 4.14 | 3.43 |
| Mch. 2–Mch. 29.. | 10.54 | 10.31 | 295.2 | 288.6 | 1.036 | 1.013 | 6.49 | 6.34 |
| Mch. 30–Apr. 26.. | 9.60 | 10.64 | 268.8 | 298.0 | .902 | 1.000 | 5.38 | 5.96 |
| Apr. 27–May 24.. | 9.88 | 6.68[4] | 276.6 | 187.0 | .880 | .595 | 4.04 | 2.73 |
| May 25–June 21.. | 6.10 | ..... | 170.8 | ..... | .516 | ..... | 4.02 | ..... |
| June 22–July 19.. | 6.20 | ..... | 173.6 | ..... | .518 | ..... | .....[5] | ..... |
| July 20–Aug. 16.. | 6.20 | 6.20 | 173.6 | 173.6 | .511 | .511 | 4.69 | 4.69 |
| Aug. 17–Sept. 13.. | 6.20 | 6.20 | 173.6 | 173.6 | .502 | .502 | 16.53 | 16.53 |
| Sept. 14–Oct. 11.. | 6.50 | 6.50 | 182.0 | 182.0 | .522 | .522 | 13.00 | 13.00 |
| Oct. 12–Nov. 8.. | 10.51 | 15.46 | 294.4 | 432.8 | .831 | 1.222 | 9.65 | 14.19 |
| Nov. 9–Dec. 6.. | 10.83 | 18.14 | 303.2 | 508.0 | .827 | 1.386 | 4.93 | 8.26 |
| Dec. 7, 1915–Jan. 3, 1916 | 11.31 | 18.11 | 316.8 | 507.0 | .832 | 1.332 | 15.09 | 24.14 |
| Jan. 4–Jan. 31.. | 11.60 | 14.21 | 324.8 | 398.0 | .839 | 1.029 | 12.99 | 15.92 |
| Feb. 1–Feb. 28.. | 11.60 | 14.32 | 324.8 | 401.0 | .824 | 1.017 | 10.83 | 13.37 |
| Feb. 29–Mch. 27.. | 11.60 | 15.00 | 324.8 | 420.0 | .805 | 1.041 | 9.28 | 12.00 |
| Mch. 28–Apr. 24.. | 11.44 | 15.99 | 320.4 | 447.6 | .771 | 1.077 | 7.63 | 10.66 |
| Apr. 25–May 8 (*14 days*) | 11.60 | 16.00 | 162.4 | 224.0 | .769 | 1.061 | 13.53 | 18.66 |
| Total time: Dec. 8, 1914, to May 8, 1916, 518 days... | 9.805 | 9.978 | 5 079[6] | 5 168.6 (2.5843T) | .811 | .825 | 7.356 | 7.485 |

[1]Grain was ground during the first winter.
[2]No hay was fed from May 14 to July 19, 1915.
[3]On pasture from May 14 to October 11, 1915.
[4]For 17 days.
[5]The fillies lost in weight during the period June 22 to July 19, as may be seen from Tables 3 and 4.
[6]45.35 bushels of corn; 79.36 bushels of oats.

The amounts and kinds of feeds were well adapted to the needs of the fillies. An average daily gain of 1⅓ pounds, a total gain in weight of 690.5 pounds, and a total gain in height of almost 8 inches is entirely satisfactory. Several factors—distemper, drying up of pasture in late summer, and flies—were responsible for the comparative irregularity of the increases in weight. Shortly after the trial started the fillies all had distemper, several of them quite severely, but at all other times they were in thrifty condition, and made an excellent growth of bone and muscle. At no time during the trial did they carry more condition than was desirable from the standpoint of growth. The actual growth in height was in all probability not as uneven as the table shows it to be. At the beginning of the experiment it was somewhat of a proposition to get the weanlings to stand properly while the standard was applied, and during the winter months the cinders in the exercise lot kept the feet of the fillies considerably shorter than they were when on grass.

TABLE 3.—INDIVIDUAL GAINS IN WEIGHT BY PERIODS

(Expressed in pounds)

| Period: 28 days | Blue Bell | Dorothy | Dottie Sloan | Eleanor | Isabel | Karol | Madame | Midinette | Primrose | Miss Yoke |
|---|---|---|---|---|---|---|---|---|---|---|
| Initial weight Dec. 8, 1914..... | 810 | 725 | 930 | 970 | 685 | 880 | 830 | 810 | 775 | 815 |
| Dec. 8–Jan. 4.... | 30 | 70 | 75 | 55 | 40 | 30 | 90 | 60 | 65 | 70 |
| Jan. 5–Feb. 1.... | 60 | 50 | 50 | 45 | 40 | 10 | 20 | 35 | 40 | 75 |
| Feb. 2–Mch. 1.... | 65 | 60 | 40 | 95 | 100 | 80 | 85 | 75 | 65 | 65 |
| Mch. 2–Mch. 29.... | 50 | 45 | 45 | 45 | 5 | 60 | 65 | 40 | 55 | 45 |
| Mch. 30–Apr. 26.... | 75 | 45 | 35 | 65 | 40 | 65 | 55 | 5 | 45 | 70 |
| Apr. 27–May 24.... | 90 | 50 | 55 | 80 | 60 | 50 | 70 | 80 | 75 | 75 |
| May 25–June 21.... | 10 | 35 | 60 | 45 | 40 | 75 | 40 | 30 | 50 | 40 |
| June 22–July 19.... | 0 | –25 | –40 | –15 | 25 | –5 | –15 | 10 | –15 | –5 |
| July 20–Aug. 16.... | 40 | 40 | 35 | 25 | 30 | 35 | 50 | 55 | 50 | 10 |
| Aug. 17–Sept. 13.... | 5 | –10 | 15 | 10 | 15 | 10 | 35 | 0 | 20 | 5 |
| Sept. 14–Oct. 11.... | 25 | –15 | –10 | –15 | 20 | 25 | 25 | 30 | 40 | 15 |
| Oct. 12–Nov. 8.... | 35 | 60 | 45 | 80 | 55 | 20 | 5 | –20 | –10 | 35 |
| Nov. 9–Dec. 6.... | 70 | 55 | 85 | 40 | 55 | 65 | 50 | 75 | 70 | 50 |
| Total gain: Dec. 8, 1914–Dec. 6, 1915.. | 555 | 460 | 490 | 555 | 525 | 520 | 575 | 475 | 550 | 550 |
| Dec. 7–Jan. 3.... | 20 | 20 | 20 | 55 | 10 | –5 | 35 | –5 | 30 | 30 |
| Jan. 4–Jan. 31.... | 20 | 25 | 35 | 35 | 20 | 20 | 15 | 20 | 35 | 25 |
| Feb. 1–Feb. 28.... | 15 | 35 | 35 | 0 | 35 | 45 | 25 | 30 | 30 | 50 |
| Feb. 29–Mch. 27.... | 30 | 40 | 45 | 90 | –5 | 50 | 25 | 20 | 15 | 40 |
| Mch. 28–Apr. 24.... | 50 | 45 | 50 | 45 | 45 | 40 | 40 | 30 | 35 | 40 |
| [1]Apr. 25–May 8.... | –10 | 15 | 20 | 25 | 25 | –20 | 20 | 25 | 15 | 5 |
| Total gain: Dec. 7, 1915–May 8, 1916.. | 125 | 180 | 205 | 250 | 130 | 130 | 160 | 120 | 160 | 190 |
| Total gain: Dec. 8, 1914–May 8, 1916.. | 680 | 640 | 695 | 805 | 655 | 650 | 735 | 595 | 710 | 740 |
| Final weight..... | 1 490 | 1 365 | 1 625 | 1 775 | 1 340 | 1 530 | 1 565 | 1 405 | 1 485 | 1 555 |

[1]14 days.

Alfalfa hay fed with corn and oats gave results of a character which indicates that there is little or no need of feeding bran or other purchased mill feeds when a good quality of alfalfa hay can be grown on the farm. Because of its high protein and mineral content, of calcium especially, alfalfa hay is well suited to grow the heavy muscles and large, strong bones which are necessary for the real drafter. A greener, leafier quality of hay was fed to these fillies than usually gives best results when fed to hard-worked horses; and it was not found necessary in the case of these growing fillies, as with mature animals, to limit the amount of alfalfa hay fed. Furthermore, when alfalfa hay is the roughage used, a considerable proportion of the grain ration, in this trial one-half by weight, may be corn, the grain grown in greatest quantity in the Middle West.

It seems quite clear from this and other similar trials that in addition to liberal grain feeding, which is admittedly necessary and important for growing drafters, the development of size and quality of bone is also intimately connected with the grazing on pasture of nutritious grasses and clovers and the feeding of good legume rough-

TABLE 4.—WEIGHTS, HEIGHTS, AND GAINS OF ALL THE FILLIES BY PERIODS

| Period: 28 days | Average weight per head[2] | Average daily gain in weight per head | Average total gain in weight per head | Average height per head[3] | | Average total gain in height per head |
|---|---|---|---|---|---|---|
| | *lbs.* | *lbs.* | *lbs.* | *hands* | *inches* | *inches* |
| Dec. 8, 1914–Jan. 4, 1915 | 854.1 | 2.09 | 58.5 | 13 | 2.35 | 1.20 |
| Jan. 5–Feb. 1 | 895.8 | 1.52 | 42.5 | 13 | 3.55 | .80 |
| Feb. 2–Mch. 1 | 959.8 | 2.61 | 73.0 | 14 | .35 | .49 |
| Mch. 2–Mch. 29 | 1 017.4 | 1.63 | 45.5 | 14 | .84 | .76 |
| Mch. 30–Apr. 26 | 1 064.8 | 1.79 | 50.0 | 14 | 1.60 | .40 |
| Apr. 27–May 24 | 1 122.2 | 2.45 | 68.5 | 14 | 2.00 | .63 |
| May 25–June 21 | 1 182.8 | 1.52 | 42.5 | 14 | 2.63 | .67 |
| June 22–July 19 | 1 196.4 | –.30 | –8.5 | 14 | 3.30 | .15 |
| July 20–Aug. 16 | 1 213.7 | 1.32 | 37.0 | 14 | 3.45 | .03 |
| Aug. 17–Sept. 13 | 1 234.6 | .38 | 10.5 | 14 | 3.48 | .47 |
| Sept. 14–Oct. 11 | 1 244.7 | .50 | 14.0 | 14 | 3.95 | .50 |
| Oct. 12–Nov. 8 | 1 264.9 | 1.09 | 30.5 | 15 | .45 | .04 |
| Nov. 9–Dec. 6 | 1 309.4 | 2.20 | 61.5 | 15 | .49 | .66 |
| Dec. 7, 1915–Jan. 3, 1916 | 1 358.8 | .75 | 21.0 | 15 | 1.15 | .34 |
| Jan. 4–Jan. 31 | 1 382.0 | .89 | 25.0 | 15 | 1.49 | .36 |
| Feb. 1–Feb. 28 | 1 408.1 | 1.07 | 30.0 | 15 | 1.85 | 19 |
| Feb. 29–Mch. 27 | 1 440.7 | 1.25 | 35.0 | 15 | 2.04 | .23 |
| Mch. 28–Apr. 24 | 1 484.1 | 1.50 | 42.0 | 15 | 2.27 | .04 |
| [5]Apr. 25–May 8 | 1 507.7[2] | .86 | 12.0 | 15 | 2.73[4] | ... |
| Total time: Dec. 8, 1914, to May 8, 1916 | ..... | 1.333 | 690.5 | .. | .... | 7.96 |

[1]Calculated from weekly weights. [2]Final average weight, 1513.5 pounds. [3]At beginning of each period. [4]Final height, 15 hands 2.31 inches. [5]14 days.

ages during seasons when such pasture is not available. In this test desirable growth of frame was made on pasture which was not fully indicated by the weights of the fillies. On most farms it would be of advantage to use more pasture than was available in this trial, and in the winter to feed some of the coarse roughages, such as corn fodder, oat straw, or sorghum along with alfalfa.

When, as the experiment shows, an average of 45.35 bushels of corn, 79.36 bushels of oats, 2.58 tons of alfalfa, and four-fifths of an acre of good pasture will keep individuals of the kind used in this experiment in thrifty and salable condition from the fall of the year in which they are foaled up to the time they are two years of age, it would seem worth while to grow out well-bred young drafters properly, and thus obtain the size and finish which experience has shown to be necessary for the greatest remuneration.

## FEED CONSUMED AND GAINS BY SEASONS

Table 5, giving the feed consumption and the gains by seasons, shows that the largest gains, in proportion to feed consumed, were made during the first winter, when an average of 5.674 pounds of grain and 4.266 pounds of hay were required per pound gain. The second winter feeding period required an average of 9.228 pounds of grain and 12.990 pounds of hay, the average grain requirement per pound of gain being at this time almost twice as much and the hay requirement slightly over three times as great as it was during the first winter.

It is of particular advantage to have pure-breds well grown at two years of age, because well-grown individuals of both sexes are in good demand at that age. A study of these figures would seem to show the fallacy of attempting to make good draft horses by roughing weanlings thru the winter with stunted yearlings as a result. Continued liberal feeding thru the summer and the succeeding winter made big, growthy, two-year-old fillies that were much nearer maturity than if they had been forced to subsist on a ration too limited in either or both the quantity and the quality of the nutrients which it contained. The group pictures of the two-year-olds will prove interesting in this connection.

## WEIGHTS AND HEIGHTS OF THE FILLIES AT ONE AND TWO YEARS OF AGE

The weights and heights recorded in Table 6 were taken on the days the fillies were one and two years of age. Dorethy and Isabel, foaled in June and July, are not included in the average for the eight head, because in addition to being foaled late they were hardly drafty enough to be compared with the others. A comparison of the illustrations of the individuals and the data regarding their respective

TABLE 5.—FEED CONSUMED AND GAINS BY SEASONS

| Time | Average daily ration per head | | Average total feed per head | | Average daily feed per day per cwt. of animal | | Average amount of feed required per pound gain | | Average daily gain in weight per head | Average total gain in weight per head | Average total gain in height per head |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grain | Hay | Grain | Hay | Grain | Hay | Grain | Hay | | | |
| | *lbs.* | *lbs.* | *lbs.* (*bu.*) | *lbs.* (*tons*) | *lbs.* | *lbs.* | *lbs.* | *lbs.* | *lbs.* | *lbs.* | *inches* |
| First winter: Dec. 8–May 13, 157 days..... | 11.023 | 8.287 | 1 730.60 (C 15.45) (O 27.04) | 1 301.00 (.65) | 1.1356 | .8540 | 5.674 | 4.266 | 1.943 | 305.0 | 4.17 |
| Summer: May 14–Oct. 11, 151 days..... | 6.469 | 3.505 | 976.80 (C 8.72) (O 15.26) | 529.20 (.26) | .5360 | .2905 | 7.602 | 4.118 | .851 | 128.5 | 1.93 |
| Second winter: Oct. 12–May 8, 210 days..... | 11.293 | 15.897 | 2 371.60 (C 21.17) (O 37.06) | 3 338.40 (1.67) | .7880 | 1.1090 | 9.228 | 12.990 | 1.224 | 257.0 | 1.86 |
| One year: Dec. 8–Dec. 6... | 9.079 | 7.613 | 3 305.00 (C 29.51) (O 51.64) | 2 771.00 (1.39) | .8120 | .6810 | 6.289 | 5.273 | 1.444 | 525.5 | 6.80 |
| Five months: Dec. 7–May 8... | 11.519 | 15.569 | 1 774.00 (C 15.84) (O 27.72) | 2 397.60 (1.20) | .8090 | 1.0940 | 10.750 | 14.530 | 1.071 | 165.0 | 1.16 |
| Total: One year and 5 months, Dec. 8, 1914, to May 8, 1916 ..... | 9.805 | 9.978 | 5 079.00 (C 45.35) (O 79.36) | 5 168.60 (2.58) | .8110 | .8250 | 7.356 | 7.485 | 1.333 | 690.5 | 7.96 |

gains as given in Tables 3 and 6 will prove of interest. The heaviest filly, Eleanor, weighing 1,260 pounds at one year and 1,775 pounds at two years of age, was one of the "top" fillies of the lot.

TABLE 6.—WEIGHTS AND HEIGHTS OF THE FILLIES AT ONE AND TWO YEARS OF AGE

| Name | Weight at one year | Weight at two years | One year's gain in weight | Height at one year | | Height at two years | | One year's gain in height |
|---|---|---|---|---|---|---|---|---|
| | *lbs.* | *lbs.* | *lbs.* | *hands* | *inches* | *hands* | *inches* | *inches* |
| Blue Bell..... | 1 120 | 1 550 | 430 | 14 | 2¼ | 15 | 3 | 4¾ |
| Dorethy..... | 1 060 | 1 425 | 365 | 14 | 1¾ | 15 | 2 | 4¼ |
| Dottie Sloan... | 1 200 | 1 690 | 490 | 14 | 2½ | 15 | 2 | 3½ |
| Eleanor..... | 1 260 | 1 775 | 515 | 15 | ¼ | 16 | ⅛ | 3⅞ |
| Isabel..... | 1 035 | 1 430 | 395 | 14 | 2¾ | 16 | ½ | 5¾ |
| Karol..... | 1 095 | 1 570 | 475 | 14 | 2¾ | 15 | 3⅜ | 4⅝ |
| Madame..... | 1 135 | 1 545 | 410 | 14 | 2¾ | 15 | 3½ | 4¾ |
| Midinette..... | 1 035 | 1 435 | 400 | 14 | ¼ | 15 | 1 | 4¾ |
| Primrose..... | 1 120 | 1 555 | 435 | 14 | 1½ | 15 | 2 | 4½ |
| Miss Yoke..... | 1 060 | 1 505 | 445 | 14 | 1½ | 15 | 2¼ | 4¾ |
| Average for 10 head..... | 1 112 | 1 548 | 436 | 14 | 2¼ | 15 | 2¾ | 4½ |
| Average for 8 head[1]..... | 1 128 | 1 578 | 450 | 14 | 2¼ | 15 | 2⅔ | 4⅝ |

[1]The late-foaled fillies, Dorethy and Isabel, are excluded in the average for the eight head.

## COST OF FEEDS

In Table 7 are presented three sets of figures showing the costs of feed for the different seasons and the total for the one year and five months during which the trial continued. A and B prices are those used in figuring the cost of feed in several other feeding trials conducted by the Experiment Station. C prices represent the actual prices paid for the grain used during the second winter as delivered at the barn. The alfalfa hay which was fed at that time had a value of not more than $11 in the mow. Using these latter figures, the cost in cents per pound of gain was 7.98 for the first winter, 16.04 for the summer, and 16.31 for the second winter. The average total cost of feed per head with C prices was $56.07 for the year and $86.88 for the year and five months. Comparison of the pictures of the weanlings with those of the two-year-olds will show pretty well the development which was made. It is believed that on many farms where pure-breds are raised, similar results could be had at less, rather than more expense for feed. A modification of the ration fed during the trial, as suggested in discussing Table 2, would probably be the means of accomplishing this.

TABLE 7.—COST OF FEEDS

| Time | | Average total cost of feed per head | | | Av. total cost of feed per head per day in *cents* | | | Average cost of feed per pound gain in *cents* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | A | B | C | A | B | C |
| First winter: Dec. 8–May 13, 157 days | Grain | $19.47 | $20.86 | $17.19 | | | | | | |
| | Hay | 10.41 | 9.11 | 7.16 | | | | | | |
| | Total | $29.88 | $29.97 | $24.35 | 19.03 | 19.09 | 15.51 | 9.80 | 9.83 | 7.98 |
| Summer: May 14–Oct. 11, 151 days (⅘ acre of pasture per head) | Grain | $10.99 | $11.77 | $ 9.70 | | | | | | |
| | Hay | 4.23 | 3.70 | 2.91 | | | | | | |
| | Pasture | 10.00 | 8.10 | 8.00 | | | | | | |
| | Total | $25.22 | $23.57 | $20.61 | 16.70 | 15.61 | 13.65 | 19.63 | 18.34 | 16.04 |
| Second winter: Oct. 12–May 8, 210 days | Grain | $26.68 | $28.59 | $23.56 | | | | | | |
| | Hay | 26.71 | 23.37 | 18.36 | | | | | | |
| | Total | $53.39 | $51.96 | $41.92 | 25.42 | 24.74 | 19.96 | 20.77 | 20.22 | 16.31 |
| One year: Dec. 8–Dec. 6 | Grain | $ 37.18 | $ 39.84 | $32.83 | | | | | | |
| | Hay | 22.17 | 19.40 | 15.24 | | | | | | |
| | Pasture | 10.00 | 8.10 | 8.00 | | | | | | |
| | Total | $ 69.35 | $ 67.34 | $56.07 | 19.05 | 18.50 | 15.40 | 13.20 | 12.81 | 10.67 |
| Five months: Dec. 7–May 8, 154 days | Grain | $ 19.96 | $ 21.38 | $17.62 | | | | | | |
| | Hay | 19.18 | 16.78 | 13.19 | | | | | | |
| | Total | $ 39.14 | $ 38.16 | $30.81 | 25.42 | 24.78 | 20.00 | 23.72 | 23.13 | 18.67 |
| One year and five months: Dec. 8–May 8, 518 days | Grain | $ 57.14 | $ 61.22 | $50.45 | | | | | | |
| | Hay | 41.35 | 36.18 | 28.43 | | | | | | |
| | Pasture | 10.00 | 8.10 | 8.00 | | | | | | |
| | Total | $108.49 | $105.50 | $86.88 | 20.94 | 20.37 | 16.77 | 15.71 | 15.28 | 12.58 |

A = Alfalfa, $16 per ton; corn, 56 cents per bushel; oats, 40 cents per bushel; pasture, $2 per calendar month per head.

B = Alfalfa, $14 per ton; corn, 65 cents per bushel; oats, 40 cents per bushel; pasture, $1.50 per 28 days per head.

C = Alfalfa, $11 per ton; corn, 50 cents per bushel; oats, 35 cents per bushel; pasture, $10 per acre—8 acres.

## COMPOSITION OF THE FEEDS

TABLE A.—CHEMICAL COMPOSITION OF THE COMPOSITE SAMPLES OF THE FEEDS CONSUMED BY THE FILLIES

(Results expressed in percent of the fresh substance)

Analyzed by H. S. Grindley and C. I. Newlin

| Kind of feed | Dry matter | Nitrogen-free extract | Crude protein (Nx6.25) | Ether extract | Crude ash | Crude fiber |
|---|---|---|---|---|---|---|
| Dec. 14, 1914, to Mar. 7, 1915: | | | | | | |
| Ground corn..... | 88.98 | 73.43 | 9.24 | 3.03 | 1.30 | 1.99 |
| Ground oats..... | 93.56 | 61.93 | 13.31 | 5.26 | 3.34 | 9.72 |
| Alfalfa hay..... | 92.86 | 38.89 | 14.75 | 1.82 | 6.50 | 30.90 |
| Mar. 8 to May 30, 1915: | | | | | | |
| Ground corn..... | 88.91 | 72.76 | 9.46 | 3.28 | 1.38 | 2.03 |
| Ground oats..... | 92.01 | 59.32 | 13.67 | 5.04 | 3.63 | 10.35 |
| Alfalfa hay..... | 91.64 | 41.36 | 13.96 | 2.03 | 5.82 | 28.47 |
| May 31 to June 27, 1915: | | | | | | |
| Shelled corn..... | 88.52 | 71.09 | 9.63 | 4.33 | 1.35 | 2.13 |
| Oats..... | 91.62 | 56.43 | 15.04 | 5.47 | 3.71 | 10.97 |
| June 28 to Aug. 22, 1915: | | | | | | |
| Shelled corn..... | 88.66 | 71.92 | 9.20 | 4.10 | 1.31 | 2.12 |
| Oats..... | 91.31 | 56.43 | 15.04 | 5.47 | 3.71 | 10.97 |
| Aug. 23 to Oct. 17, 1915: | | | | | | |
| Shelled corn..... | 89.11 | 71.94 | 9.52 | 4.25 | 1.32 | 2.09 |
| Oats..... | 92.16 | 59.00 | 13.27 | 5.42 | 3.78 | 10.68 |
| Alfalfa hay..... | 91.36 | 38.85 | 14.87 | 2.10 | 6.53 | 29.01 |
| Oct. 18 to Dec. 12, 1915: | | | | | | |
| Shelled corn..... | 86.96 | 69.99 | 9.45 | 4.23 | 1.22 | 2.07 |
| Oats..... | 89.72 | 60.21 | 10.45 | 5.23 | 3.31 | 10.43 |
| Alfalfa hay..... | 89.18 | 35.17 | 15.61 | 1.63 | 7.34 | 29.43 |
| Dec. 13, 1915, to Feb. 6, 1916: | | | | | | |
| Shelled corn..... | 87.57 | 70.89 | 9.19 | 3.37 | 1.93 | 2.18 |
| Oats..... | 88.86 | 59.41 | 10.46 | 5.51 | 3.28 | 10.20 |
| Alfalfa hay..... | 90.07 | 34.84 | 16.26 | 2.07 | 6.62 | 30.28 |
| Feb. 7 to April 30, 1916: | | | | | | |
| Shelled corn..... | 85.87 | 70.25 | 9.34 | 2.97 | 1.30 | 2.02 |
| Oats..... | 90.27 | 60.34 | 10.56 | 5.82 | 3.34 | 10.21 |
| Alfalfa hay..... | 91.37 | 38.99 | 15.21 | 2.14 | 6.25 | 28.77 |

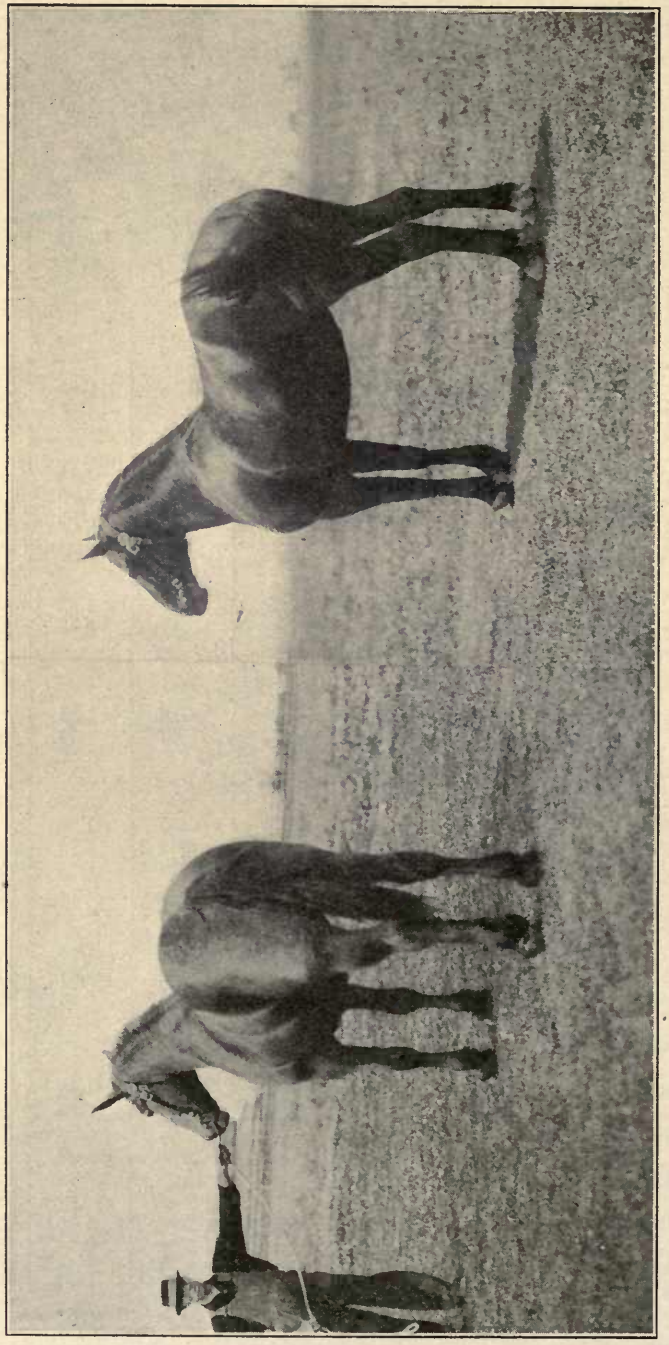

FIG. 5.—BLUE BELL AS A TWO-YEAR-OLD

FIG. 6.—DOROTHY AS A TWO-YEAR-OLD

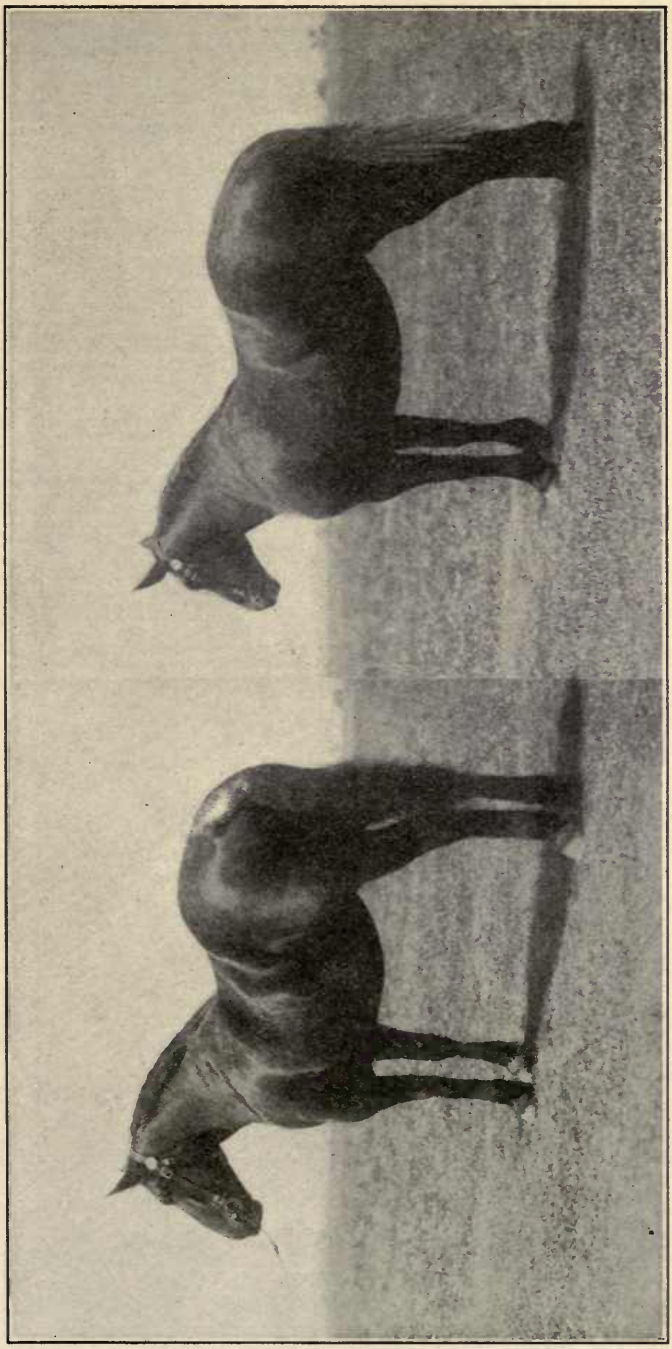

FIG. 7.—DOTTIE SLOAN AS A TWO-YEAR-OLD

FIG. 8.—ELEANOR AS A TWO-YEAR-OLD

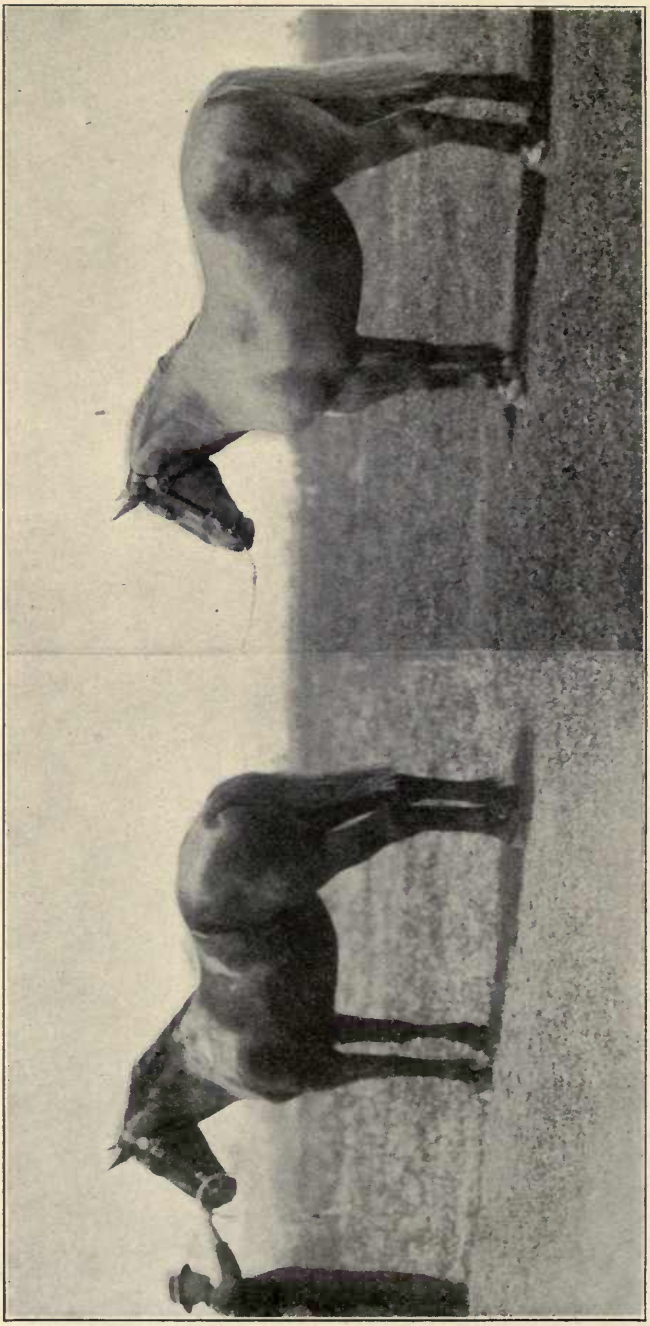

FIG. 9.—ISABEL AS A TWO-YEAR-OLD

FIG. 10.—KAROL AS A TWO-YEAR-OLD

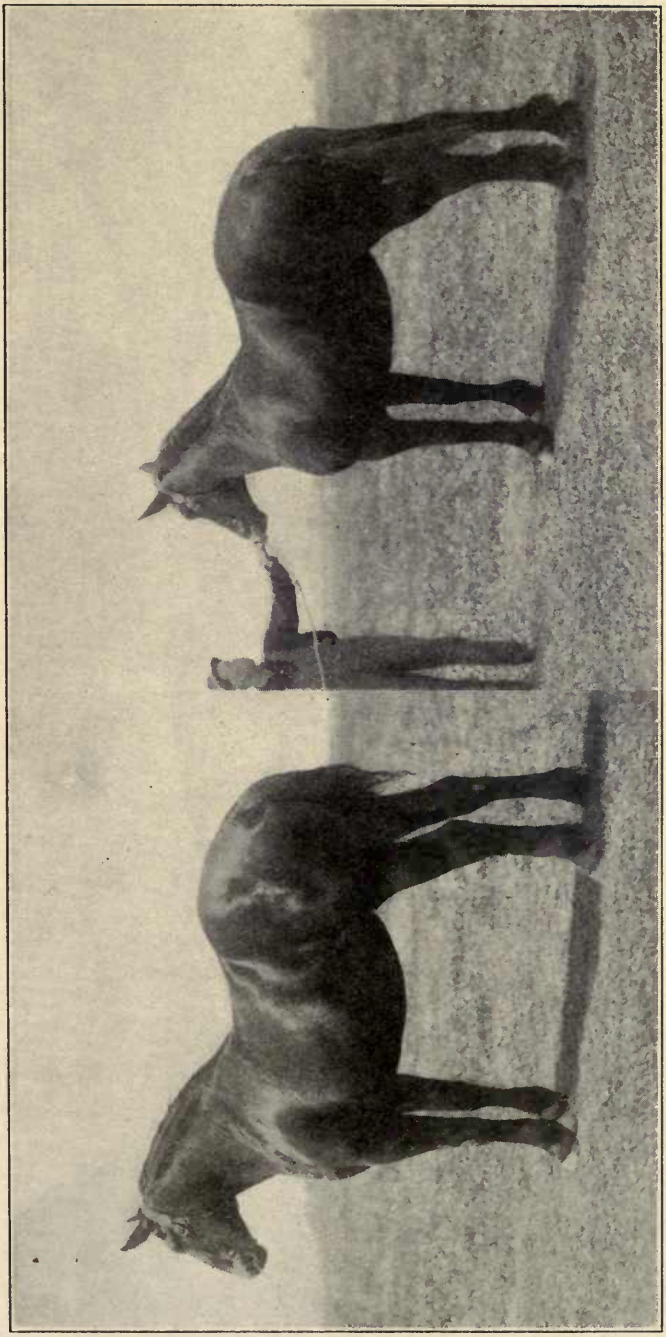

FIG. 11.—MADAME AS A TWO-YEAR-OLD

FIG. 12.—MIDINETTE AS A TWO-YEAR-OLD

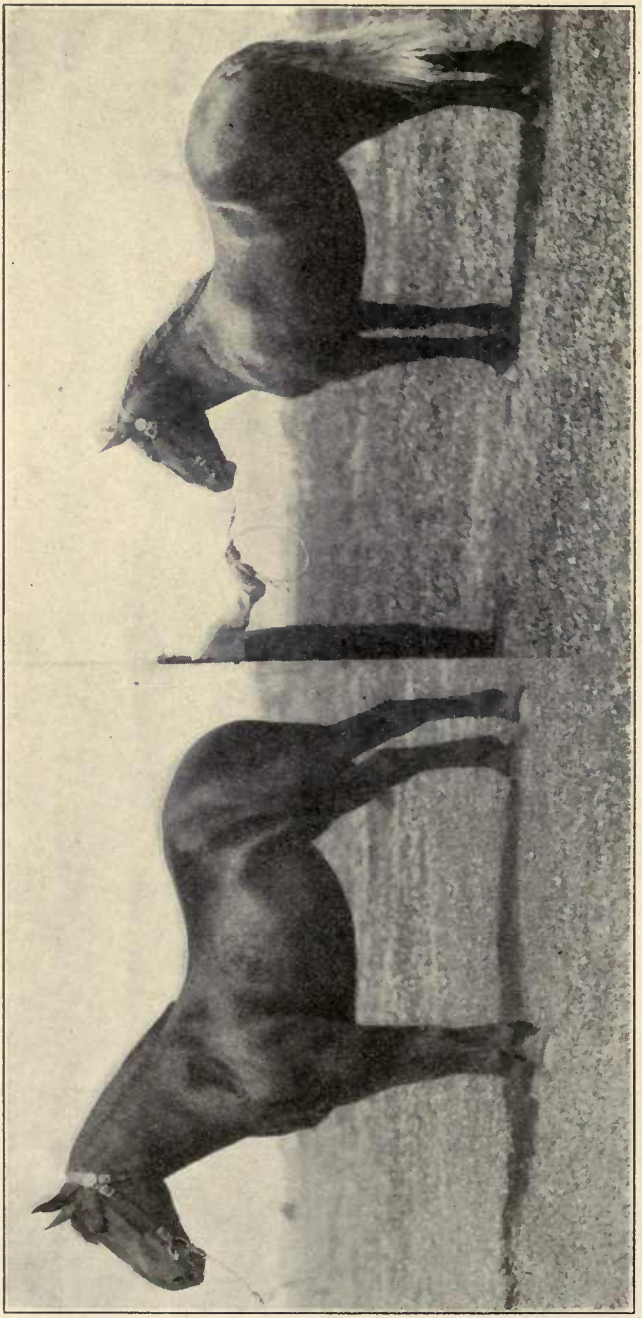

FIG. 13.—PRIMROSE AS A TWO-YEAR-OLD

FIG. 14.—MISS YOKE AS A TWO-YEAR-OLD

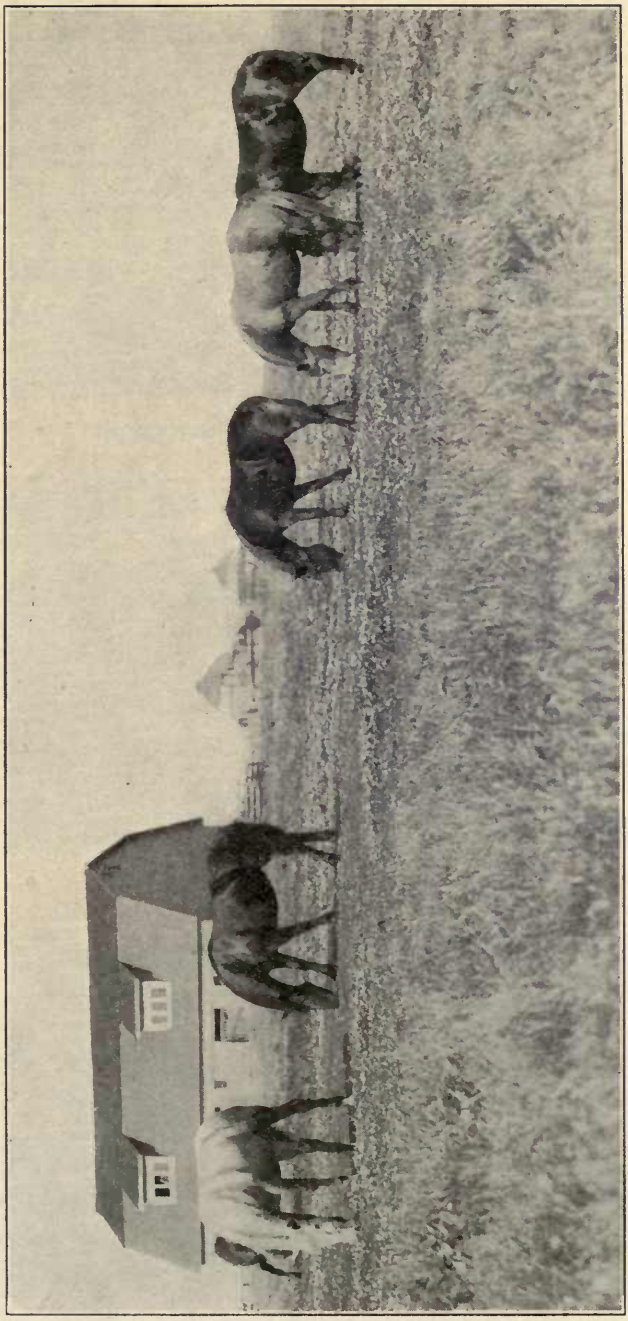

FIG. 15.—ON PASTURE AT CLOSE OF TRIAL

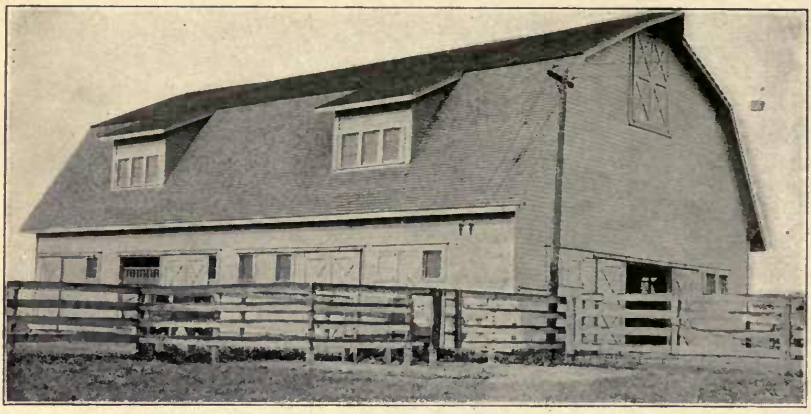

FIG. 16—BROOD MARE BARN WHICH SHELTERED THE LOT

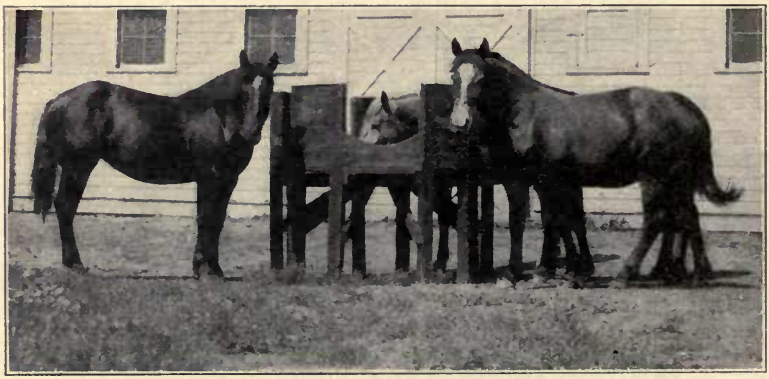

FIG. 17.—TUMBLER AND FILLIES

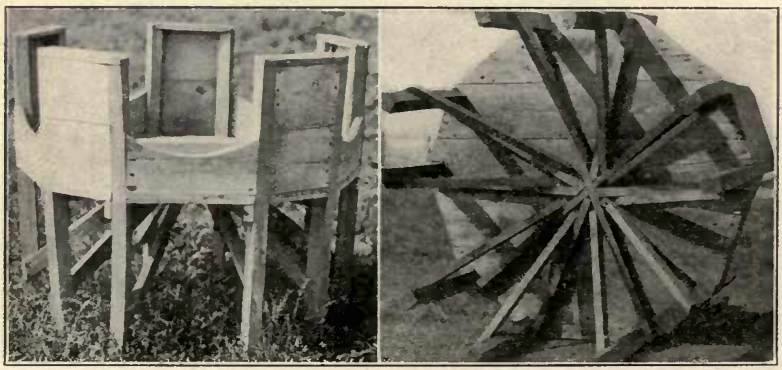

FIG. 18.—TUMBLER USED FOR FEEDING GRAIN IN PASTURE